Project Number and Title: 00195 - Pristane Monitoring in Mussels

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Abstract: Pristane in Prince William Sound (PWS) mussels (*Mytilus trossulus*) has been monitored for the last 5 years to assess whether seasonal variability of tissue concentrations may be related to recruitment of salmon and herring. Pristane is an environmentally persistent hydrocarbon naturally produced by *Neocalanus* copepods in PWS. These copepods account for nearly all of the planktonic biomass available as prey for zooplanktivorous fishes during early Spring, especially juvenile pink salmon during initial marine residence. Laboratory and field experiments have confirmed that these fishes excrete some of the pristane ingested with *Neocalanus* copepods in feces, and the feces are subsequently ingested by mussels. The time scale for pristane accumulation by mussels exposed to pristane-laden feces is a few days, and for depuration of accumulated pristane a few weeks. Monitoring pristane concentration increases in mussels during Spring thus indicates the conversion of nearby copepods into fish feces, implying growth of the zooplanktivorous predators. Rapid growth during early life history is essential for high survival.

Last year, marine survival of juvenile pink salmon released *en masse* from PWS hatcheries was found to be significantly associated with pristane concentration increases in mussels near hatcheries 2 - 3 weeks following releases. Pristane concentrations have been monitored during Spring at a network of 30 stations for each of the last 5 years in PWS. Hatcheries in PWS have released most pink salmon juveniles in large groups of up to 130 million per group, usually during May. Comparison of marine survival determined from adults returning to these hatcheries, with pristane concentration increases in mussels collected from sampling stations within 25 km of hatcheries before and 2 - 3 weeks following release of juveniles, showed that 33% of the interannual survival variability is explained by pristane increases ($P < 0.05$, $df = 13$).

These results strongly suggest that continued monitoring of pristane in mussels may have predictive value to forecast marine survival of hatchery-released pink salmon. The current network of sampling stations is not optimized geographically with respect to hatchery locations. At the one hatchery where the geographic locations of sampling stations are nearly optimal, pristane increases account for 82% of marine survival ($P < 0.05$, $df = 3$). Beginning Spring 2000, additional stations will be sampled near the other hatcheries to improve geographical coverage. Annual survival forecasts will be made for each of the hatcheries on a provisional basis to evaluate the utility of pristane monitoring as a salmon management tool. The relation of these hatchery forecasts to wild-stock survival will also be evaluated, based on concurrent pristane increases at stations more distant from hatcheries. This may potentially extend the utility of pristane monitoring to wild salmon stock management in PWS.